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**Proof****CONTROL ID:** 1264173**TITLE:** The Surface Water and Ocean Topography Satellite Mission – An Assessment of Swath Altimetry Measurements of River Hydrodynamics**PRESENTATION TYPE:** Assigned by Committee**CURRENT CATEGORY:** Surface Water Storage**AUTHORS (FIRST NAME, LAST NAME):** Matthew D Wilson<sup>1</sup>, Michael Durand<sup>2,3</sup>, Douglas Alsdorf<sup>2,3</sup>, Hahn Chul Jung<sup>3</sup>, Konstantinos M Andreadis<sup>4</sup>, Hyongki Lee<sup>3</sup>

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**ABSTRACT BODY:** The Surface Water and Ocean Topography (SWOT) satellite mission, scheduled for launch in 2020 with development commencing in 2015, will provide a step-change improvement in the measurement of terrestrial surface water storage and dynamics. In particular, it will provide the first, routine two-dimensional measurements of water surface elevations, which will allow for the estimation of river and floodplain flows via the water surface slope. In this paper, we characterize the measurements which may be obtained from SWOT and illustrate how they may be used to derive estimates of river discharge. In particular, we show (i) the spatio-temporal sampling scheme of SWOT, (ii) the errors which may be expected in swath altimetry measurements of the terrestrial surface water, and (iii) the impacts such errors may have on estimates of water surface slope and river discharge. We illustrate this through a "virtual mission" study for a ~300 km reach of the central Amazon river, using a hydraulic model to provide water surface elevations according to the SWOT spatio-temporal sampling scheme (orbit with 78° inclination, 22 day repeat and 140 km swath width) to which errors were added based on a two-dimension height error spectrum derived from the SWOT design requirements. Water surface elevation measurements for the Amazon mainstem as may be observed by SWOT were thereby obtained. Using these measurements, estimates of river slope and discharge were derived and compared to those which may be obtained without error, and those obtained directly from the hydraulic model. It was found that discharge can be reproduced highly accurately from the water height, without knowledge of the detailed channel bathymetry using a modified Manning's equation, if friction, depth, width and slope are known. Increasing reach length was found to be an effective method to reduce systematic height error in SWOT measurements.

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